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Homework 4

My homework 4 consists of a program that detects objects and a program that determines whether a user on camera is shaking their heads yes or no.

For Object detection I used the imread() function to read in the image that I was processing, imshow() to show the image we are using, waitkey() which waits for a user to press any key on the keyboard, threshold() which made the image a black and white image, dilate() dilated the image, erode() eroded the image, connectedComponentsWithStats() recorded info on the connected components in the image, and destroyAllWindows() closed all cv2 windows open.
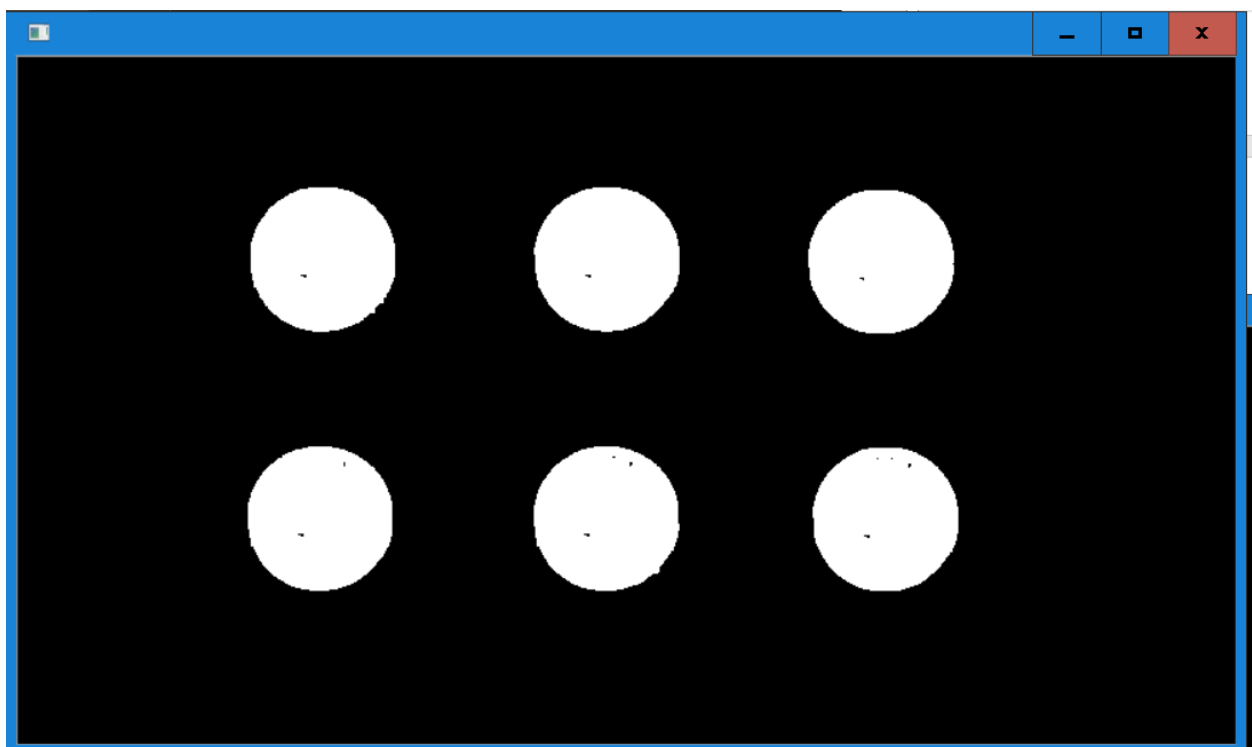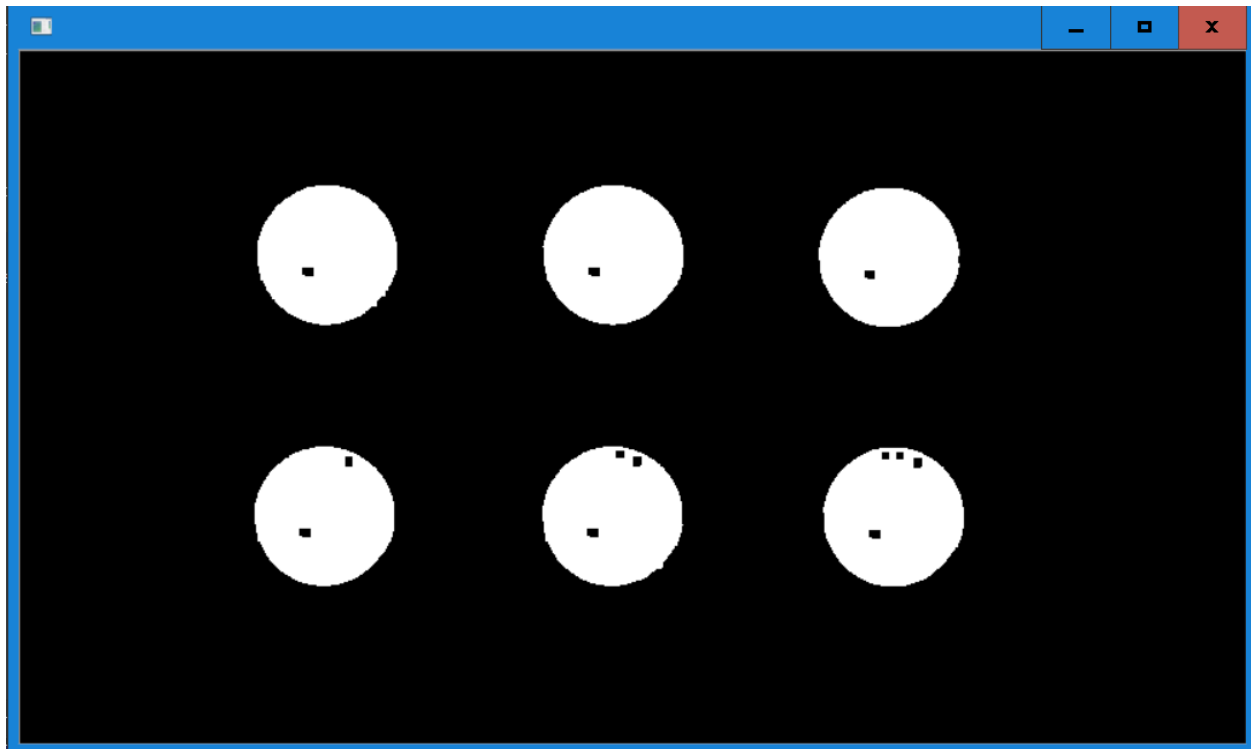
Prints original image

Prints Otsu thresholded image:
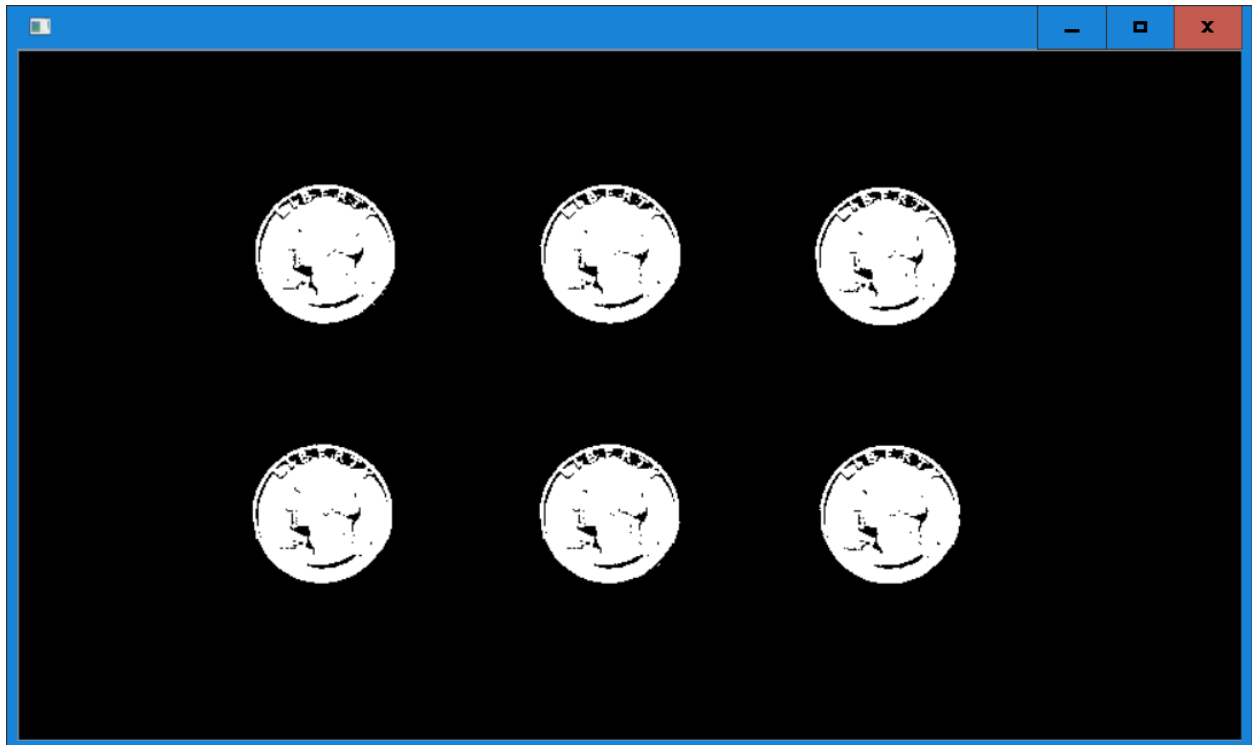
Prints dilated image:

Prints eroded image:

Print out Stats:

```
C:\Users\tholl\PycharmProjects\computervision\venv\Scripts\python.exe C:/Users/tholl/PycharmProjects/computervision/venv/Include/main.py
Number of Objects:  6
object 0  has the coordinates [213.04963285 140.5055752 ]
The width is:  97
The height is:  97
The area is:  7354
object 1  has the coordinates [411.77471703 140.48111278]
The width is:  98
The height is:  97
The area is:  7333
object 2  has the coordinates [603.43921035 142.24002723]
The width is:  98
The height is:  96
The area is:  7345
object 3  has the coordinates [211.07185875 321.95031481]
The width is:  97
The height is:  97
The area is:  7306
object 4  has the coordinates [411.21657276 322.22866566]
The width is:  98
The height is:  97
The area is:  7277
object 5  has the coordinates [606.5486274  322.74837909]
The width is:  98
The height is:  96
The area is:  7249

Process finished with exit code 0
```

For the program that determines whether a user on camera is shaking their heads yes or no I first read in the classifier files. I then started capturing video. Next, I created empty lists for the face and eye x and y histories. This is so that I can keep track of how they change. I then enter a loop that will run until the user quits. It reads in the video frame by frame. In the first code section I check if the history lists have

more then a certain number of items (10) and if they do I pop the oldest one. I then read in the frame from video. I convert this to gray scale. I then feed it through the face classifier. Next, I pass the gray scale image to a loop that checks for the eye's locations. After this I append the values for the face and eyes x and y coordinates to the appropriate list. I now find the average of each list and compare it with the current values. If it is a certain number different from the old values I have it print yes (for vertical changes) or no (for horizontal changes). I then show the frame to the user of the frame with color. Lastly, I have an if statement that allows users to quit by pressing q which ends the program and closes all open windows for cv2.